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Distribution to:

from: R. J. Stern

subject: Feasible Sun Elevation Ranges for the Apollo 16 Descartes Mission -- Case 310

955 L'Enfant Plaza North, S.W. Washington, D. C. 20024

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# MEMORANDUM FOR FILE

Sun elevation ranges for the Apollo 16 mission to Descartes satisfying several mission requirements are presented in the attached graph. The approach azimuth employed is -90 degrees; the surface stay time, 68 hours. pertain to mission durations of approximately 12 days for nominal (To) and one-day later (T124) launches and 13 days

for one-day early (T-24) launches. Actual weights, consumables and propellant dispersions as reported in the August 15, 1971 MSC Weight and Performance Report were assumed.

The SPS contingency AV range illustrates composite limits for launch azimuths of 72, 90, and 100° satisfying both the LM rescue requirement of 600 ft/sec and the end-ofmission weather avoidance requirement of 250 ft/sec. elevation range for a minimum 5° post-rendezvous bootstrap plane change capability represents those sun elevations for which the end-of-mission  $\Delta V$  reserve is greater than 700 ft/sec. allowing 450 ft/sec for the 5° post-rendezvous plane change and 250 ft/sec for end-of-mission reserve. TEI AV variations with plane change are assumed negligible. Also presented in the figure are the sun elevation ranges for which 210 ft antenna PDI coverage from Parkes or Goldstone is possible.

For a T-24 opportunity in April, a five-degree plane change capability is possible for a 72° launch azimuth but not for 90 or 100°. However, four degree plane change capability is feasible throughout the launch window for a sun elevation range of 9-11 degrees. For a T-24 opportunity in May, five-degree plane change capability is possible only for sun elevations up to  $7^{\circ}$ .

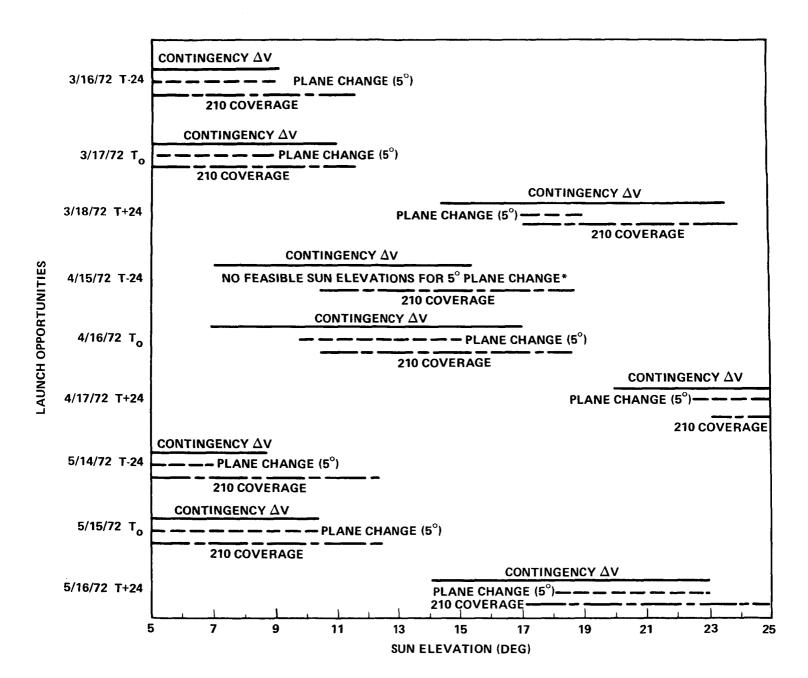
J. Stern

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Attachment

FF No. 6



\*7-13° FEASIBLE FOR 72° LAUNCH AZIMUTH, NO FEASIBLE VALUES FOR 90 OR 100° LAUNCH AZIMUTH WITH 5° PLANE CHANGE

**FEASIBLE SUN ELEVATION RANGES FOR APOLLO 16** 



Subject: Feasible Sun Elevation Ranges

for the Apollo 16 Descartes

Mission - Case 310

From: R. J. Stern

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